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REVIEWS.

The Naples Fauna (*Fauna with Manticoceras intumescens*) *in Western New York.* By JOHN M. CLARKE. 16th Ann. Rep. N. Y. State Geol., pp. 31–165, Plates I–IX.

The faunas of the Upper Devonian period in New York, are of great interest to all students of the geologic phases of palæontology. In the earliest fauna of this period, the Cuboides fauna of the Tully limestone, there appear suddenly several new types of organisms, chiefly brachiopods, among which the most important is *Hypothyris cuboides*, which have no genetic predecessors in the region. These strangers or exotic forms, therefore, must be considered as migration species whose previous evolution had taken place in some other geologic province, but which, with the establishment of some new line of communication at the beginning of Upper Devonian time, were enabled to find their way into the New York province. By a careful study of this Cuboides fauna and its geographic distribution, Professor H. S. Williams has been led to the conclusion that it first developed in the European or Eurasian province and later migrated into North America, coming in from the northwest along the Mackenzie basin, moving southward and finally eastward into the New York province.

The Naples or Intumescens fauna, which is the subject of Professor Clarke's paper, is a successor of the Cuboides fauna in western New York. Like the latter it is a widely distributed fauna in Europe, and it is always characterized by the goniatite genus *Manticoceras* of which the species *M. intumescens* is the common European form. Outside of New York the fauna characterized by this type of goniatite is found in North America only in Iowa and in the Mackenzie basin. In these two localities the characteristic goniatite is but sparsely represented, but in western New York it is present in considerable abundance and is represented by numerous species. From the evidence, therefore, it would seem that this fauna also found its way from Europe into North America by the same path along which the Cuboides fauna had migrated, but at a little later time. Along the way it left but slight traces, but when it reached that part of the Upper Devonian seas which is now western New York, it found a wonderfully congenial environment and blossomed out anew.

The strata occupied by the normal Intumescens fauna are those of the typical Portage series of Hall in western New York. The fauna makes its first appearance, however, in the Styliola limestone in the midst of the Genesee shale, after which it disappears during the deposition of the Upper Genesee shales, to reappear in the Portage beds. Such a preliminary appearance of a new fauna, before it becomes an established normal fauna, is called by Professor Clarke a *prenuncial* fauna. The Styliola limestone, therefore, contains the prenuncial Intumescens fauna.

Further east, in the Ithaca section, the Intumescens fauna never became the normal fauna, but there existed contemporaneously with it a fauna which was constituted in large part of a recurrence of Hamilton species. Occasionally, however, a species of *Manticoceras* wandered into this region from the west and is found associated with the Ithaca fauna.

From this relation of faunas it will be readily seen that the term Portage cannot be used both in a stratigraphic and in a faunal sense. If it is used as a faunal name it must be restricted to the Intumescens fauna, the fauna of the original Portage rocks. If it is used as a stratigraphic name to include all those strata in New York which were deposited during a given portion of Upper Devonian time, it will include at least two quite distinct faunas. For the expression of the time duration and the geographic restriction of a particular faunal province, a technical term is often needed; a term which has not only a time significance, but a geographic significance as well. For this Professor Clarke has proposed the term *Zoehemera;* thus the zoehemera of *Manticoceras intumescens* would be the time during which the Intumescens fauna existed in the restricted geographic area in which it was distributed.

Professor Clarke's paper is devoted entirely to the cephalopods of the fauna, but the reader is led to believe that the remaining classes will be discussed at an early date. Of the cephalopods thirty species and varieties are recognized, twenty-one of them being described as new. Thirteen of the forms belong to the characteristic Intumescens fauna genus, *Manticoceras.* Under the older conception of species of goniatites nearly all of these might perhaps be included in the one general species *M. intumescens*, but with the modern methods of ontogenetic study of the cephalopods, which have been used in a most satisfactory way in conducting this investigation, specific lines are drawn with far greater precision. The ontogenetic stages of most of the species are carefully described and fully illustrated by many figures in the text, so that the paper is valuable to the biologist as well as to the geologist.

STUART WELLER.

Geological Survey of Canada, Annual Report. New Series, Vol. IX, 1896. DR. G. M. DAWSON, Director.

During the year work was done in British Columbia, Alberta, Ontario, Quebec, Nova Scotia, Labrador, and the region west of Hudson Bay.

In British Columbia Messrs. McConnel and McEvoy gave their attention to the mining region around Nelson, Trail and Rossland. Some important facts are noted regarding the occurrence of ores. A boring in the Cretaceous formation at Athabasca Landing, Alberta, was carried to a depth of 1770 feet in the hope of reaching the petroleum-bearing "tar-sands" which form part of the lowest member of that formation to the northeast. The boring had to be abandoned, but other attempts will be made.

The report of Mr. J. B. Tyrrell on his work in the unexplored region west of Hudson Bay is one of special interest. He gives an historical sketch of earlier explorations of Hudson Bay and adjacent lands, many of which were connected with the search for a "Northwest Passage." The formations observed include the Recent, Pleistocene, Silurian, Cambro-Silurian, Cambrian, Huronian and Laurentian, of which the last is by far the most extensive. Pleistocene sea beaches and terraces are found at heights of 100 to 600 feet above sea level. In several places series of four to seven terraces mark shore lines of later glacial and postglacial times. The glacial geology of the region is accorded about twenty pages of the report. Several centers of glacial outflow are noted, about 140 strial directions recorded and many eskers, drumlins, moraines and extra-glacial lakes are described. A map accompanies the report.

Dr. Bell's report on his work in Ontario consists of a correlation of reports of work done at various times on the area of the French